Diurnal Cycle of Precipitation over the Maritime Continent:

Using TRMM3B42, TRMM PFs and ISCCP Weather State Datasets

Lakemariam Y. Worku[1], Carl J. Schreck III[2], and Ademe Mekonnen[1]

North Carolina A&T State University[1] and North Carolina State University[2]

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INTRODUCTION

- The Maritime Continent (MC) is part of globe which is a collection of number of large and small islands exhibit significant diurnal cycle.
- The diurnal cycle is a significant atmospheric component that is a manifestation of the atmosphere-ocean-land-cryosphere systems in response to solar radiation.
- Eastward moving wave disturbances like Madden-Julian Oscillation (MJO) pass through the MC and mostly modulated by the diurnal cycle over the MC as previous studies suggested.
- This study will focus on understanding the diurnal cycle of precipitation over the MC and its role in modulation of large scale intraseasonal systems like MJO using different satellite measurement products.

DATA AND METHODOLOGY

Data sources: Tropical Rainfall Measurement Mission (TRMM) and International Satellite for Cloud Climatology Project (ISCCP)

- TRMM3B42 (Version 7): 1998-2015
- TRMM Cloud and Precipitation Features (PFs): 1997-2013
- ISCCP Infrared Weather State (IR-WS): 1983-2008

Methodology

- TRMM3B42 3 hourly data were averaged over the years for 20^0S to 20^0N of tropics
- Binning of TRMM PFs variables
- ISCCP IR-WS data's were categorized in to eight groups (IR-WS 1-8) based on there convective characteristics. We only select IR-WS1 (convectively active regime of deep convective clouds) and IR-WS3 (intermediate regime mid-level congestus clouds)

RESULTS

TRMM3B42, TRMM PFs & ISCPP

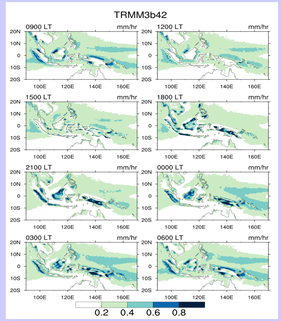


Figure 1 –Diurnal cycle of precipitation (mm/hr) from TRMM3B42 (1998-2014)

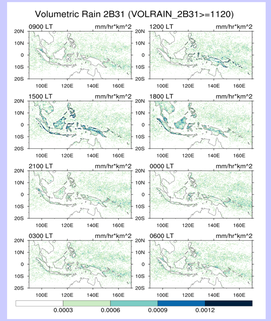


Figure 2 – Diurnal cycle of TRMM Precipitation Features (1997-2013)

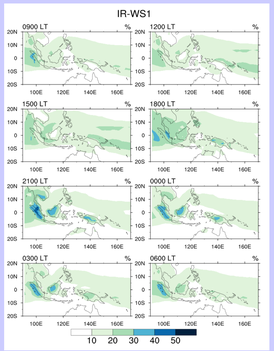


Figure 3 – Diurnal cycle of ISCCP Weather State 1 (IR-WS1) Frequency (%) (1983-2008)

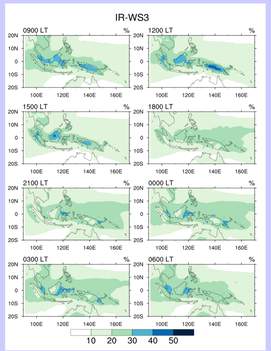
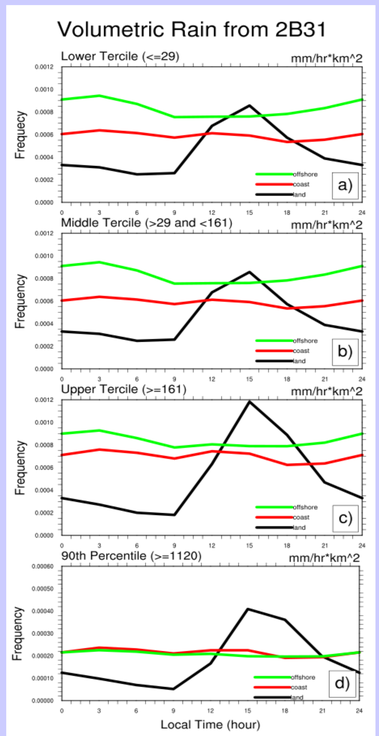


Figure 4 – Diurnal cycle of ISCCP Weather State 3 (IR-WS3) Frequency (%) (1983-2008)

Time Series Analysis of TRMM3B42, PFs & ISCCP



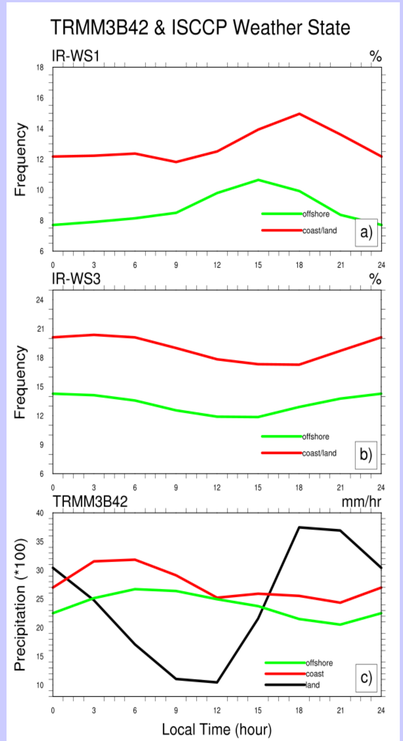


Figure 5 – Time Series Analysis of ISCCP Infrared Weather State, TRMM3B42, and TRMM PFs (VOLRAIN_2B31)

DISCUSSION AND SUMMARY

- The TRMM3B42 has peak rainfall over land regions during late afternoon through early morning and it reaches its peak over coastal sea and offshore regions in the morning through noon (fig. 1).
- The TRMM Precipitation Feature peak over land region starts around 1200LT through 1800LT (fig. 2).
- Infrared Weather State one (IR-WS1) reach its peak over land region late afternoon through morning mainly over Sumatra and Borneo islands. Infrared Weather State three (IR-WS3) has a strong presence to the west of the MC from over land and coastal region from early morning to noon (fig. 3 & 4 respectively).

- The analysis of diurnal cycle from three datasets indicates diurnal cycle over land is stronger than over coastal sea and ocean regions.
- The convective activity over land due to latent heat and orographic effect of islands contribute to a strong diurnal variation of rainfall.
- IR-WS1 is active convective cloud systems and it clearly shows its strong contribution for diurnal cycle of precipitation than IR-WS3 especially over land regions.
- However, precipitation feature needs to be further investigated with respect to amount of precipitation from TRMM3B42.

ACKNOWLEDGEMENT

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